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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/069,951	03/07/2002	Philippe Gaucher	220152US0PCT	7084

22850 7590 07/17/2003

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EXAMINER	
SAGAR, KRIPA	

ART UNIT	PAPER NUMBER
1756	

DATE MAILED: 07/17/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Offic Action Summary	Application No. 10/069,951	Applicant(s) GAUCHER, PHILIPPE
	Examiner Kripa Sagar	Art Unit 1756

-- The MAILING DATE f this communication appears n the c ver sheet with the c rrespondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on _____ .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-22 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-22 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☒ The proposed drawing correction filed on 24 April 2003 is: a)☒ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Response to Amendment

1. The amendment filed 4/24/03 has been entered. Claims 1-20 have been amended. New claims 21-22 have been added. No new matter has been introduced by the amendment.

Claims 1-22 are under consideration.

Drawings

2. The proposed drawing correction and/or the proposed substitute sheets of drawings, filed on 4/24/03 has been approved.

In response to the Applicant's inquiry regarding Fig.3, attention is directed to p.8;lines 24-32 which indicate the failure modes of a ceramic formed by *conventional* methods. Fig.3 (A-B) illustrate the failure modes of delamination and substrate bending in a prior-art process and not in the instant invention.

A proper drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The correction to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

3. Applicant's amendment is sufficient to overcome the rejections under 35 USC 112 presented in the earlier office action dated 10/24/02 (paper #7).

Applicant's clarification of the starting materials of the cross-linked resin is acknowledged and placed on record.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 1- 6, 10-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over non-patent literature of Tohge and co-worker (Jl.Mat.Sc.,v10, (1999) p.273-277), hereinafter Tohge (1999), in view of US Pat. 5244691 to Valente et al.

The invention discloses a resin for forming oxide thin films, a process of forming oxide thin films from the resin and devices comprising such thin film oxides.

Claims 1-6 are directed towards a resin composition comprising metal alkoxides, chelating organic agents, acids and a photoinitiator.

Claims 10-17 recite the process steps of coating a resin comprising metal alkoxides, patterning the coated film by photolithographic steps, drying and sintering the patterned layer to form the oxide pattern.

Tohge (1999) teaches a method of forming photosensitive resins containing polymerized alkoxides. The resins are formed from the reaction of *metal n-butoxides* with chelating agents *AcAc* or benzylacetone (BzAc). The metal alkoxides include *Ti- and Zr- alkoxides*. Tohge (1999) does not add *acetic acid* and *Pb-carboxylate,* instead

uses Pb-acetate. A *complex alkoxide Pb-Zr-Ti* (PZT) bearing resin is formed. The resin is coated and patterned with *UV irradiation* (p.273-274). The substrates may be *glass* or *Si*. The patterning steps include *exposure* through a *mask* and *development* of unexposed areas. The patterned areas are sintered to form the oxides (fig.1). In the past, similar processes were used to pattern oxides such as *ZrO2, TiO2*, Al2O3, SiO2 from their *simple alkoxides* (p273). Tohge (1999)teaches the formation of *ferroelectric* thin films

Tohge (1999) does not teach the addition of an acid or HMTA (cl.1,6,10). Tohge (1999) does not teach the use of a heavy alcohol as a functional radical or solvent (cl.11).

Valente teaches the fabrication of ceramic films by spin coating a resin comprising the ceramic and sintering the film. A sol-gel process is used where the ceramic composition is formed from the *metal-alkoxide* and Pb-acetate. It teaches the use of *AcAcH* and *HMTA* to form the polymer. *Acetic acid* stabilizes the resin and may also be used as a *solvent* along with an alcohol such as methoxyethanol (3; 44-4;5). The film is dried and sintered. It may be noted that both Valente and Tohge (1999) teach formation of oxide thin films by sol-gel. Valente teaches that the process is complex and difficult to control (2;6-18).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Valente to form the oxide films of Tohge (1999) because Valente's compositions reduce the number of components(3;21-

24), may be adapted to deposit a large number of diverse materials and provide tight controls on the rheology and deposition (3;25-37).

6. Claims 7,8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tohge (1999)in view of Valente as applied to claim 1 above and further in view of US Pat. 4957945 to Cohn and further in view of US Pat.6002031 to Duncombe et al.

The claims recite the use of propanoic acid and tetrafluoroacetic acid as solvents.

The teachings of Tohge (1999)and Valente have been discussed above. Tohge (1999)does not teach the use of acids. Valente teaches the use of acetic acid. They do not teach the use of the propanoic acid and tetrafluoroacetic acid.

Duncombe teaches the use of carboxylic acids in forming metal oxide films from a modified sol-gel process; this includes propanoic acid (4;31-33). Duncombe does not use tetrafluoroacetic acid.

Cohn teaches that fluorinated carboxylic acids in general and tetrafluoroacetic acid are well known solvents for polymers (5;67 –6;3). Their low-boiling point is emphasized and the evaporation at low temperatures is noted (5;52-55).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute propanoic acid or tetrafluoroacetic acid for Valente's acetic acid as a solvent in Tohge's (1999) sol-gel process because carboxylic acids in general (Duncombe) and fluorinated carboxylic acids in particular (Cohn) are suitable solvents for polymers that may be used with a reasonable expectation of success in forming sol-gel polymers.

7. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tohge(1999) in view of Valente as applied to claim 1 above, and further in view of US Pat. 5846686 to Kamisawa.

This claim recites the addition of a photoinitiator to the resin.

Kamisawa teaches the addition of a photoactive compound to a resin comprising alkoxides and used in forming ceramic films (9; 53-67).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to add a photoactive compound to Valente's resin used for forming a ceramic film as taught by Tohge(1999) because Kamisawa teaches that this increases the image resolution and facilitates development of the exposed film (11;53-12;14)

8. Claims 1-6, 10-17 are further rejected under 35 U.S.C. 103(a) as being unpatentable over US Pat. 5244691 to Valente et al. in view of the non-patent literature of Tohge and co-worker (Jl.Mat.Sc.,v10, (1999) p.273-277).

Valente teaches the fabrication of ceramic films by spin coating a resin comprising the ceramic and sintering the film. A sol-gel process is used where the ceramic composition is formed from the *metal-alkoxide* and Pb-acetate. It teaches the use of *AcAc* and *HMTA* to form the polymer. *Acetic acid* stabilizes the resin and may also be used as a *solvent* along with an alcohol such as methoxyethanol (3; 44-4;5). The viscosity may be adjusted by evaporating the solvent. Conventionally this evaporation is carried out by heating the mixture. The film is dried and sintered (3;58-66).

Valente does not teach photocuring the polymer.

Tohge (1999) teaches a method of forming photosensitive resins containing polymerized alkoxides. The resins are formed from the reaction of *metal n-butoxides* with chelating agents *AcAcH* or benzylacetone (BzAcH). The metal alkoxides include *Ti- and Zr- alkoxides*. A *complex alkoxide Pb-Zr-Ti* (PZT) bearing resin is formed. The resin is coated and patterned with *UV irradiation* (p.273-274). The substrates may be *glass* or *Si*. The patterning steps include *exposure* through a *mask* and *development* of unexposed areas. The patterned areas are sintered to form the oxides (fig.1). In the past, similar processes were used to pattern oxides such as *ZrO2, TiO2*, Al2O3, SiO2 from their *simple alkoxides* (p273). Tohge(1999) teaches the formation of *ferroelectric* thin films using the process.

It may be noted that both Valente and Tohge (1999) teach forming ceramic films using the sol-gel process. One of ordinary skill in the art at the time the invention was made would have been motivated to use UV radiation to cure or pattern the gelled film as taught by Tohge (1999) in Valente's process because Tohge (1999) teaches that this direct fine-patterning process facilitates fabrication of optical and electronic devices Tohge (1999 : p.273; # 1).

9. Claim 1 is further rejected under 35 U.S.C. 103(a) as being unpatentable over US Pat.5494700 to Anderson et al. in view of US Pat. 5944866 to Chen et al and further in view of US Pat. 5100764 to Paulson et al.

Anderson teaches most of the elements of claim 1 (Fig.1) including the metal alkoxides and solvents (5;13-34), acid addition (5;53-64), and heating the mixture (6;12-23) to form a polymeric pre-cursor.

Anderson does not teach use of HMTA or UV radiation.

Chen teaches the use of HMTA as a stabilizer and gellation agent (3;40-59) in a process analogous to Anderson's.

Chen does not teach the use of UV radiation.

Paulson teaches the inclusion of a photoactive compound in the precursor polymer used in a process for forming glass and ceramic films, analogous to Anderson's and Chen's. UV irradiation is used to pattern the films (3;7-23).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to add HMTA, as taught by Chen to Anderson's solutions and UV expose the resulting resin film as taught by Paulson because Chen teaches that HMTA serves multiple functions during the process ((3;40-59) and thereby reduces the amount of the agents required (3;1-8) while Paulson teaches that UV-patterning before calcining makes the films amenable for use in the electronic device fabrication (1; 41-66).

10. Claim 18,20 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Valente.

Valente teaches fabricating capacitors and ferro-electric memories (4-49-68). The instant claim does not detail the structure of the capacitor; any capacitor or memory formed by any process would function as well as the instant claimed devices.

11. Claim 19 is rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Mori.

Mori teaches that it is known in prior art to use complex perovskitic oxides as piezo-electric materials (1;14-16). Any piezo-electric device would function as well as the instant-claimed device.

12. Claims 21-22 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over US Pat.4541855 to Scherer.

Scherer teaches a method of forming a glass or ceramic product (abstract). The glass or ceramic product would have the structure and function of the instant claimed glass or ceramic.

Response to Arguments

13. Applicant's arguments filed 4/24/03 have been considered but they are not persuasive.

Applicant has argued that the primary reference of Tohge(1999) does not teach the use of AcAc. Applicant states that Examiner conceded mischaracterizing the teachings of Tohge(1999) and goes on to argue that the supplementary references of Tohge (1994) and Tohge (1991) were not included in the original rejection; hence their teachings are invalid. Applicant contends that the remaining references do not make up the deficiencies of Tohge (1999) and therefore no prima facie case can be established.

Applicant's invention is in a well-developed field as admitted in the instant specification (p.1; lines1-35). Applicant's stated improvement to the process comprises a resin formed by heating a mixture of metal alkoxides with AcAc, HMTA and an acid. Applicant alleges (p.1;l.35 – p.2;l.13) that the resultant resin provides greater

homogeneity (stability) and better rheological control. These are taught by Valente, as shown above.

Applicant's first argument is clearly in error. Applicant recognizes that the only difference between Tohge's (1999) and the instant claims is that the former process uses BzAc while the instant claims use AcAc. Tohge(1999) claims a prior art process where AcAc was successfully used but the substitution of BzAc is an *improvement* on the prior art process. It would be facile for one of ordinary skill in the art to identify homologous compounds and substitute one for the other; especially in the light of reported use in prior art. Therefore the argument that Tohge (1999) does not teach the use of AcAc is disingenuous.

Applicant's attention is directed to the teachings of Valente which explicitly teaches the use of AcAc and HMTA to provide greater homogeneity (stability) and rheological control (Valente: 3;1-37).

Applicant's remaining arguments stem from mischaracterization or a gross misunderstanding of Examiner's statements at the interview. Applicant's attention is drawn to the summary of the interview which clearly states that **no agreement was reached regarding the primary reference of Tohge(1999).**

At the interview Applicant had argued that although Tohge (1999) suggested the use of AcAc in a similar process in earlier publications [Tohge(1991) and Tohge (1994)] the details of the process were not available; hence Applicant would not be able to verify the significant differences between the prior art processes and the instant process. Examiner pointed out that AcAc and BzAc were homologous solvents and

Tohge (1999)taught the equivalence of the two; hence the earlier publications were not relevant. However in the interest of furthering prosecution, Examiner agreed to provide the references cited by Tohge (1999). This was solely to facilitate Applicant's response. *This was not a concession regarding Tohge's (1999) teachings.* They were provided to the Applicant to facilitate differentiation from the instant invention and to respond. They are not relied on for the rejections.

Applicant is reminded that prior-art references merely need to teach the limitations of the claims and do not have to "enable" the invention as argued on p.7;l. 11 of the response. The test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981).

Examiner maintains the rejection and asserts that the combination of Tohge (1999) and Valente clearly establishes a prima facie case of obviousness. Applicant has not met the burden of proving the contrary.

Conclusion

14. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Tohge et al. Jl.Am.Cer.Soc., v74(1), (1991) p.64-71.

Tohge et al. Jl.Mat.Sc & Matl. in Elect., v5 (1994), p356-359.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kripa Sagar whose telephone number is 703-605-4427. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark F Huff can be reached on 703-308-2464. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

MH/ks
July 11, 2003

MARK F. HUFF
SUPERVISORY PATENT EXAMINER
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